(15%) showed ISC by DbE, compared with 57% of non-AF pts who died (p = 0.03). The predictive value of negative DbE in AF (86% over 20 m) was less than previously reported.

Conclusion: DbE is safe and feasible in pts with AF, but its prognostic value is limited, despite the apparent adequacy of stress. This likely represents technical difficulties with DbE interpretation.

1153 Echocardiographic Methods

Tuesday, March 31, 1998, 3:00 p.m.–5:00 p.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 3:00 p.m.–4:00 p.m.

1153-137 Non-linear Harmonic Imaging of Tissue: A Superior New Technology for Left Ventricular Border Delineation

M. Knoll, C.L. Reid, A. Hata, T. Tokushima, J. Main, J.M. Gardin. *University of California, Irvine, Orange, CA, USA*

Non-linearly generated harmonic (NLH) imaging of tissue has been reported to improve image resolution by decreasing acoustic clutter and side-lobe artifact. To determine whether this new technology improves sensitivity for delineation of the left ventricular (LV) myocardial/blood interface, a nonselected series of 13 patients (7 females/6 males; mean age 53 years) underwent two-dimensional echocardiography with both standard (STAND) and NLH tissue imaging (Acuson Sequoia). A STAND transducer transmit frequency of 3.5 MHz and harmonic receive frequency of 3.5 MHz were used. LV was divided into 16-wall segments and further classified as anterior (Ant), inferior (Inf), posterior (Post), and lateral (Lat) regions. A quality score of 0 to 4 was assigned to each segment based on a consensus of two readers; 202 segments were compared.

Results: (See Table): NLH yielded significant improvement in each region compared with STAND imaging: mean quality score differences were 0.96 post, 0.89 lat, 0.84 ant, and 0.43 inf. Analyses of individual segments showed significant improvement in all but the basal septum. This improvement resulted from a reduction in the speckle pattern and boundary enhancement.

	Ant	Lat	Post	Inf
STAND	1.44	1.23	1.83	1.95
NLH	2.28	2.12	2.79	2.38
p value	< 0.0001	0.0001	0.0005	0.001

Conclusions: Non-linear tissue harmonic imaging increases sensitivity, compared to standard imaging, for delineation of the left ventricular endocardial border. Benefits extend beyond the apex to virtually all segments of the left ventricle.

1153-138 Omniplane Transthoracic Echocardiography Provides an Easy Method to Estimate Mitral Annulus Size and Shape: Verification by Voxel-based Three-dimensional Echocardiography

L.M. Galeano, S. De Castro, J. Yao, T.-L. Hsu, N. Pandian. *Tufts, New England Medical Center, Boston, Mass., USA*

Background: Accurate assessment of mitral annulus (MA) size and shape is important in planning mitral valve repair. Conventional transthoracic 2D echo is limited in this regard.

Methods: To explore the potential of a new method, Omniplane *transthoracic* echocardiography (Omni2DE), we studied 20 pts (16 to 83 yrs), with the Omni2DE probe (3.7/5 MHz, H-P) that steers the imaging array thorough 180°. We imaged from the *parasternal* acoustic window. In addition, voxel-based 3D echo (3DE) was performed using rotational approach (TomTec). In the Omni2DE, we examined 18 planes (10° increment from 0 to 180, with long-axis considered as 0°) and measured MA area (sqcm) from the best plane, as well as maximum (Dmax) and anteroposterior (Dap) diameters (cm), in systole (S) and diastole (D). These were compared to data derived from 3DE.

Results (Mean ± SD): The MA was best defined in the range of 60 to 70°; the comparisons between were:

	3DE	Omni2DE	Regression	r	p
Area D	14 ± 3.6	15 ± 4.3	y = 0.59x + 5.2	0.69	< 0.001
S	8.7 ± 3.4	8.3 ± 3.4	y = 0.84x + 0.97	0.83	< 0.001
Dmax D	4.9 ± 0.7	5.2 ± 0.8	y = 0.43x + 2.7	0.50	< 0.05
S	3.8 ± 0.7	3.7 ± 0.7	y = 0.65x + 1.4	0.70	< 0.001
Dap D	3.4 ± 0.7	3.4 ± 0.8	y = 0.67x + 1.1	0.78	< 0.001
S	2.6 ± 0.7	2.6 ± 0.7	y = 0.56x + 1.1	0.64	< 0.01

Conclusions: Omni2DE allows quantitative assessment of MA size and shape by yielding correct imaging planes to visualize MA. It is an easy method that provides important information in a simple manner.

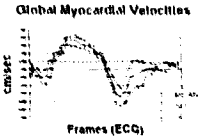
1153-139 A New Computerized Method for Evaluating Myocardial Left Ventricular Function by Tissue Doppler Imaging

P. Trambaiolo, L. Cacciotti, M. De Santis, S. De Castro, G. Magni, E. Pensalfino, F. Fedele. *"La Sapienza" University Rome, Italy*

Background: Tissue Doppler Imaging (TDI) is a new non-invasive ultrasound technique that allows the measurement, in real time, of myocardial velocities during the cardiac cycle. However TDI offers only limited possibilities of quantification by positioning a small ROI. Aims of this study were 1) to develop a simple and useful computerized system to quantify regional LV function by TDI analysis 2) to characterize normal pattern of global and regional myocardial velocities 3) to evaluate the possibility of reducing the intra- and inter-observer variability.

Methods: Twelve healthy young volunteers underwent: a) Bi-dimensional echo (2-D ECHO), b) TDI and c) Magnetic Resonance Imaging (MRI), obtaining equivalent and comparable slices (4- and 2-chambers views). After computerized acquisition and loading of 25–38 frames per cardiac cycle, 2-D ECHO and MRI endocardial and epicardial contours were drawn and 100 chords were positioned and measured on each image, obtaining systolic thickening changes (%Th). After TDI velocities scale calibration, the previous saved chords were superimposed on TDI images and colors extracted and converted, having curves of regional and global (Fig) myocardial velocities *during the entire cardiac cycle*.

Results: 1) the waveforms are similar in all cases; 2) there are no significant statistical differences but only minimal regional heterogeneity in the systo-diastolic velocities and time intervals; 3) intra- and inter-observer variability is lower with TDI (1.9% and 3.2%) than with %Th analysis (7.2 and 9.4%).

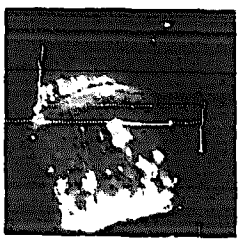


Conclusion: This new computerized method allows to achieve, by TDI analysis, the normal range of myocardial velocities during the entire cardiac cycle and it reduces intra- and inter-observer variability.

1153-140 Radial Jet Vortical Events Are Better Delineated on 3D Reconstructions of Flow Images Than on 2D Color Doppler: An In Vitro Study With Comparisons to Optical Visualization of Flow Jets

T. Shiota, B.G. Sinclair, M. Gharib, E. Rambod, D.J. Sahn. *Oregon Hlth Sci Univ, Portland, OR; Caltech, Pasadena, CA, USA*

Entrainment and vortical structures are sometimes clearly visualized in longitudinal views of flowing jets by optical visualization methods. These events also occur radially around the direction of propagation. However, vortical events are often poorly visualized on color coded flow maps because of the angle-dependence of color Doppler encoded images in 2D planar views. We performed rotational 3D reconstruction of pulsatile jet flows using a a TomTec™ imaging system, an Interspec ATL™ annular array, and a customized color map to facilitate composite video transfer of subtle *low velocity* color dynamics into the grey scale TomTec™ milieu.



The reconstructed 3D pulsatile flow images from circular and rectangular orifices (areas: 0.24 cm^2) clearly showed radial orientations of vortical entrainment events and, during propagation, also showed axial rotation of the entire jet structure within the flow field when viewed "en face" matching observations by optical visualization. By integrating flows between planes, vortical events